Human-centered Design in the Developing World

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Human-centred Design in the Developing World: Towards designing didactic games for children

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ABSTRACT

In this paper, we briefly describe the setup, design and methodological outcomes of two participatory design workshops conducted in Pakistan. The key purpose of both workshops was to understand the host community, particularly the relationship between children and parents, and design an early version of an educational game for illiterate children (early teenagers). Two workshops were conducted in two different cities of Pakistan. We report how the literacy issues of children were overcome, while designing an educational game for them. We also report the dramatic differences between two different cultures of the host community (Pakistanis) and the challenges faced by designers while designing educational aids for children

Categories and Subject Descriptors

H5.2. User Interfaces.

General Terms

Measurement, Design, Human Factors

Keywords

Participatory design, peer tutoring, workshop, game

1. INTRODUCTION

The user-centred design methodology, and in particular participatory design (PD), has been used with children as a design technique for different purposes [1]. Sometimes children were involved in the design process from the start as design partners [2] and sometimes they were involved as product evaluators at the end of the cycle [3]. There are also other variations in PD practices where children have different roles during the design process depending on the end product requirements, but crucially most of this work has been done with school going children in developed countries. There are very few examples of practicing participatory design or a user-centred design methodology in the developing world [4], especially with children that received hardly any education [5]. Regular PD practices exercised with literate children of the developed countries cannot straightforwardly be applied in developing countries and with illiterate participants. Different cultural and social norms, levels of education, power structures, children-parent relationships and local government policies all raise interesting challenges while conducting PD workshops in these settings.

In this paper, we describe a case of conducting a participatory design workshop with illiterate children of a developing country. Two design workshops were initiated by a non-profit organization operating in Pakistan for promoting basic reading and writing skills in Pakistani children (early teenagers) especially in less-developed and rural areas. The children we were focusing on typically cannot read and write, and some of them cannot even write their own name. These children work during the daytime and have virtually no time to attend a regular school or even part-time classes.

The primary purpose of these workshops was to design different educational aids for assisting illiterate children in learning local languages. For achieving this goal in a user-centred way, we wanted to explore different design methods for understanding children's needs and their visions about language learning. In this particular developing world context, we also wanted to investigate if and how different 'off the shelf' design methods can be tailored to this particular setting, and whether involving the target audience could be done in a better way. Finally, during these workshops we also aimed to get a better understanding of the everyday socio-economic problems faced by these children, which hinder their education.

In this paper we are primarily highlighting two important aspects of these workshops. Firstly, we will discuss a number of challenges faced by researchers while working in the developing world context and also how this context created new design opportunities. Secondly, we will also briefly discuss how we came up with custom-built solutions, when existing off-the-shelf design methods could not properly be applied.

2. WORKSHOP 1

The first workshop was conducted in a small town near Lahore. In this workshop five children participated and we used a small living room (in one of the children's home) as our basis for the workshop. Prior to the workshop, parents granted the permission to conduct this session and they also participated in the introductory (pre-workshop) session. The pre-workshop session was conducted in the same living room where the designer offered drinks to all children and their parents and described the purpose of the study in more detail. That session also worked as an icebreaker, especially between children and designers. The three designers presented their work on the laptop using an animated presentation.

The workshop was five days long, lasting 2-3 hours each day. We tried to make sure that the workshop took place when the children were back from their work and were ready to start the workshop, which was not always an easy task due to different working

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schedules for the different children. It turned out to be necessary to include the weekend in our 5 days plan.

2.1 Key outcomes

Overall the workshop was quite successful and well appreciated by the children. We were able to come up with the basic idea for a game that could be used as an educational tool for teaching children some basic words and sentences of the national language in an interactive and fun way. During the workshop, we also designed an initial flow, rules and low-fi prototypes of different language learning games.

The workshop was iterated based on the feedback given by children and in five days we had three major methodological improvements (in three different rounds). At the end of the first round, we improved the communication protocol, not only between researchers but also between researchers and children so that we all could understand each other. In the later stages we incorporated peer-tutoring techniques in the participatory design method and this worked quite well, especially for bringing shy children back to the discussion. We also involved a role-playing activity as an extension to the peer tutoring technique, where each individual acted out his or her envisioned scenario in front of all. In the next section we discuss some of these improvements in more detail.

2.2 Initial Results and Methodological Improvements

Out of many problems, one major problem we faced was the language barrier. There were four persons in the designers' team. Two of them were trained designers who could speak the national language and one of them could also understand the local language (in Pakistan, there is one national language, four main official provincial languages and many local languages with an extreme variety of accents). One member (an anthropologist) was only able to understand English. The designers recruited the fourth member of the team from the local community. He was a native speaker of the local language but not familiar with the English language. This problem is quite natural in settings such as the current, where preference during recruiting is given to someone who not only belongs to the local community but also speaks multiple languages.

We learned that any discussion in the foreign language between two designers was quite annoying for the participating children. Such discussions made them aware of the fact that someone from outside is present and that they are being monitored. Perhaps surprisingly discussions in English (which children did not understand) were more attention grabbing for children than discussions in the local language (which children did understand). We noted this during the post workshop sessions, when one child said, "When Daniel and you talk in English, we think you are talking about us or maybe you do not like what we are doing so we try to look at your face".

To overcome this language barrier and to avoid confusion during the workshop, we agreed upon the communication protocol before hand. We loosely defined rules of communication (e.g., who will say what when, how to use paper and pencil effectively for conveying ideas during the live session, when not to speak and when to avoid foreign language interventions during the live discussion). Every time we returned from a workshop session, we redefined and if necessary extended these protocol rules and evaluated the impact of this method.

Children's literacy was also a big problem, but interestingly this was a design challenge as well, which helped us in designing a good game. In general, we had to convey all our instructions verbally. During the third day of the workshop, children actually started using computers, and used some basic applications for brainstorming about their ideas in groups. On the one hand it was fascinating to see the learning process, but on the other hand it was extremely difficult to instruct them about using the computer. Since the children could not read and write, they were treating words on the screens as symbols and using these symbols quite intelligently while communicating to us and with their peers. They also verbalized spatial aspects of the screen ("something at the lower left corner" or "second big blue object in the centre"). We actually encouraged this symbolic and spatial language and also adapted it in our discussion. Our purpose was not to teach them computer applications or a new language right away, but to support the communication between designers and children and to enrich the design process with an active and effective communication channel.

During our interactions with kids, we found that one child was extremely good in following our instructions and learning new things. He also had a natural tendency of giving instructions to his peers and others boys were listening to him closely. We took this opportunity and formally trained this boy for a peer tutoring technique and asked him to help other persons in doing their tasks. This methodological improvement worked quite well and one boy, who during the first two days was quite shy in talking to us, also became quite active and involved as a result of this peer tutoring.

During the third day of the workshop, we also realized the need of visiting children's workplaces, because most of them not only wanted to learn as much as possible about their workplace but were also very interested in using their working environment as a learning environment. These children were under the heavy influence of their bosses (work owners) and we had the impression that some children listened more to their bosses than to their parents and would not dare to deny whatever their bosses said. It was very important to learn about this power structure and try and involve the bosses into the design process as well, in an attempt to create a win-win situation.

Figure 1. Picture from one workplace (cardboard cutting and printing press)

3. WORKSHOP 2

The NGO we were working with had to support different rural and urban areas in different regions of Pakistan. So the next challenge was to run the same workshop in another city of Pakistan, but this time not only for promoting the local language

but also the national one. Apart from this, the key objective, the setup and the design requirements were similar to the workshop 1.

3.1 Initial Results and Methodological Improvements

Even though the second workshop was conducted exactly in the same way as we had conducted the first one, and the second city was only a few hundred kilometres away, there were significant variations in cultural and social norms.

First of all, the new city was located in another province and the local language was different. For overcoming this problem we recruited a person from the local community. However, we found that the local language for the second workshop was more autonomous and people's dependence on this local language was much higher compared to the previous city. In daily life almost no one spoke the national language (only those children who went to school could speak the national language). This fact even isolated those designers who could speak the national language from the local community. Illiterate children in this community only speak the local language, and this situation is clearly quite different from the previous city where the illiterate children could understand the national language quite well.

To overcome this problem, we recruited one person from the local community and trained him before hand in the participatory design methodology. We also comprehensively briefed him about the previous workshop sessions and showed him some videos. This brief training program was quite successful and the recruited person helped us a lot, not only facilitating (and at some points controlling) the workshop but also establishing a strong communication channel among all parties.

Figure 2. Play time for children during a break

Another problem we faced was the unfortunate workshop timing imposed by the parents. They wanted us to run the workshop in the morning, before the children went to work. All children wake up early in the morning for prayer and the parents wanted us to come very early and finish our session before 9 am. The children had no say in this and the decision of the families was final. This awkward timing also affected the PD workshop as the designers were not used to working in the early morning and the children had their other routines for the morning and did not really want to participate at this time of day.

Another problem in this host community we faced was the direct intervention of parents in the workshop sessions. Some of the fathers wanted to be there and see what we were doing. They wanted to make sure that we did not misguide their children. The very first day, two fathers suddenly came in and sat near the workshop table. Their presence was a bit frightening for the children and they completely lost their attention and started behaving more cautious and controlled. This is why we requested the parents to participate in the session either at the beginning or at the very end. We always tried to finish our core discussion in between this period so that the children were not affected by any parental presences. However, at some points, the parents' intervention could not be avoided.

Another restriction imposed by the parents was the exclusion of girls from this study. They had a lot of reservations in allowing girls to participate in this user study, especially in the presence of foreigners. After some negotiations we decided that we should add one female researcher to our team. She could directly interact with these girls and would also streamline the child-to-child communication. We therefore asked one female volunteer from the NGO who could also speak the local language to join us for the workshop.

From a methodological point of view, we already incorporated a number of techniques and best practices learned during the first workshop. One key methodological improvement was using some of the video clips from the previous workshop session for training and teaching children about what to do during these workshops. We were very careful in choosing the contents of these videos, since on the one hand we did not want them to copy behaviour from the first workshop, but on the other hand we did not want to waste too much time in teaching them the basic methodological steps. Another addition to the second workshop was the use of game-like design methods. We asked children to choose a game which they liked to play during their free time, get all possible game rules out of them and designed new games based on these rules or by combining rules from different games. This resulted in far better results and in a day we had designed a number of small language learning games based on different everyday metaphors.

Apart from this, there were some other interesting findings, lesson learned and steps taken for either running 'off the shelf' UCD practices or customizing such practices in developing communities. Hopefully, this paper can be the basis of a discussion about these. We plan to publish the game design and related outcomes in a sequel to this paper.

4. CONCLUSION AND GENERAL DISCUSSION

In this position paper, we have described our experiences of conducting HCI related research in a user-centred manner in a developing country. We used a participatory design methodology for eliciting requirements and for designing education aids for illiterate children. We found that researchers cannot always deploy ready-made research methods in a straightforward manner in these communities, due to the vast social and cultural differences and constraints. These methods need to be customized according to the situation.

In one situation, when we realized that we were no longer able to engage the children in their homes during the workshops, we changed our investigation style and mixed standard workshop technique with what may be dubbed a 'design by playing' approach. We used a layout kit game and a specification game for involving children in the process and for helping them to think of future scenarios. Mixing of multiple user-centred techniques for engaging children has been with children [6] and it is shown that multiple design methods used interchangeably or in parallel are useful for eliciting complex requirements.

Another important thing to notice is the iterative nature of these workshops. The individual workshops were iterative and the results from and lessons learned in one round were incorporated into the next one. Furthermore, key lessons and best practices from the first workshop were taken up during the second workshop, and the output of the second workshop was dramatically increased. This suggests that it is extremely important to inspect the design process at different stages and tailor it according to the demands of the target audience.

We also learned that visiting researchers should have an appropriate knowledge about the cultural norms of the host community, especially if the host community has little international exposure and people are more close-minded in their attitudes and lifestyles.

During the workshop, we will also report about other, related experiences from the developing world context where we experienced how important it is to train members or staff of the local community, not only for designing computing systems but also running for these systems in a stable manner in the long run. One interesting example is the development of healthcare management and population control systems, which worked quite efficiently during the early phase but then terribly failed due to less motivation of local community and incompetence of the staff. Another interesting example, which is worth sharing, is working with specialized user groups e.g., older adults and high skilled workers. Especially in the case of the elderly, we will also discuss some of our experiences where arguably what is ethical in one country may becomes unethical in another country, and how the good manners of one culture may be perceived as poor manners in a different culture. We will also reflect on how these differences affect not only the researchers but also the design process.

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Suleman Shahid. I was born and raised in Pakistan. I am currently a doctoral candidate in the Tilburg centre for Creative Computing, Dept. of Communication and Information Sciences, at Tilburg University. My background is in Media Computing, but in the last few years I have primarily been involved in Interaction Design and social aspects of computing, particularly in a cross-cultural setting. My current research deals with cross-cultural aspects of Affective Computing. I am also interested in exploring how different design methods can be used across cultures, particularly in the developing world, and how a variety of user groups (children, elderly, highly skilled workers etc,) can be involved into the design process. From this workshop, I aim to get more insight into best practices for human-centred design in the developing world and for getting a better understanding of user characteristics, especially for users belonging to different age groups, having different skills and socio-economic backgrounds. This workshop will also be an interesting venue to talk to fellow researchers and look for possible collaborations in this area. I will also be pleased to contribute to this workshop by discussing other related projects where similar design methods are being used in the developing world context e.g., working with emergency response workers and exploring different variations of participatory design method for understanding their complex work practices.

Emiel Krahmer. Emiel Krahmer is a full professor at Tilburg University. After obtaining his PhD in 1995, he worked for six years at IPO, the Centre for User-System Interaction at the Eindhoven University of Technology. Since 2001 he works at Tilburg University, where his research concentrates on obtaining a better understanding of the way humans communicate with each other, and to improve human-computer communication based on these insights. Special interests include the role of non-verbal communication for human-human and human-computer communication, and cross-cultural differences in verbal and non—verbal communication.